Eligibility Checklist
Solar Photovoltaic Installations 10 kW or Less for One- and Two-Family Dwellings

GENERAL REQUIREMENTS

A.	System size is 10 kW AC CEC rating or less	☐ Y	☐ N
B.	The solar array is roof-mounted on one- or two-family dwelling or accessory structure	☐ Y	☐ N
C.	The solar panel/module arrays will not exceed the maximum legal building height	☐ Y	☐ N
D.	Solar system is utility interactive and without battery storage	☐ Y	☐ N
E.	Permit application is completed and attached	☐ Y	☐ N

ELECTRICAL REQUIREMENTS

A.	No more than four photovoltaic module strings are connected to each Maximum Power Point Tracking (MPPT) input where source circuit fusing is included in the inverter	☐ Y	☐ N
	1) No more than two strings per MPPT input where source circuit fusing is not included	☐ Y	☐ N
	2) Fuses (if needed) are rated to the series fuse rating of the PV module	☐ Y	☐ N
	3) No more than one non-inverter-integrated DC combiner is utilized per inverter	☐ Y	☐ N
B.	For central inverter systems: No more than two inverters are utilized	☐ Y	☐ N
C.	The PV system is interconnected to a single-phase AC service panel of nominal 120/220 Vac with a bus bar rating of 225 A or less	☐ Y	☐ N
D.	The PV system is connected to the load side of the utility distribution equipment	☐ Y	☐ N
E.	A Solar PV Standard Plan and supporting documentation is completed and attached	☐ Y	☐ N

STRUCTURAL REQUIREMENTS

A.	A completed Structural Criteria and supporting documentation is attached (if required)	☐ Y	☐ N

FIRE SAFETY REQUIREMENTS

A.	Clear access pathways provided	☐ Y	☐ N
B.	Fire classification solar system is provided	☐ Y	☐ N
C.	All required markings and labels are provided	☐ Y	☐ N
D.	A diagram of the roof layout of all panels, modules, clear access pathways and approximate locations of electrical disconnecting means and roof access points is completed and attached	☐ Y	☐ N

Notes:

1. *These criteria are intended for expedited solar permitting process.*
2. *If any items are checked NO, revise design to fit within Eligibility Checklist, otherwise permit application may go through standard process.*

Solar PV - Standard Plan
Simplified Micro-Inverter and ACM Systems for One- and Two-Family Dwellings

SCOPE: Use this plan ONLY for systems using utility-interactive Micro-Inverters or AC Modules (ACM) not exceeding a combined system AC inverter output rating of 10 kW, with a maximum of 3 branch circuits, one PV module per inverter and with PV module ISC maximum of 10-A DC, installed on a roof of a one- or two-family dwelling or accessory structure. The photovoltaic system must interconnect to a single-phase AC service panel of 120/240 Vac with service panel bus bar rating of 225 A or less. This plan is not intended for bipolar systems, hybrid systems or systems that utilize storage batteries, charge controllers or trackers. Systems must be in compliance with current California Building Standards Codes and local amendments of the authority having jurisdiction (AHJ). Other articles of the California Electrical Code (CEC) shall apply as specified in section 690.3.

MANUFACTURER'S SPECIFICATION SHEETS MUST BE PROVIDED for proposed inverters, modules, combiner/junction boxes and racking systems. Installation instructions for bonding and grounding equipment shall be provided and local AHJs may require additional details. Listed and labeled equipment shall be installed and used in accordance with any instructions included in the listing or labeling (CEC 110.3). Equipment intended for use with PV system shall be identified and listed for the application CEC 690.4(D).

Applicant and Site Information

Job Address: _____ Permit #: _____

Contractor/Engineer Name: _____ License # and Class: _____

Signature: _____ Date: _____ Phone Number:

1. General Requirements and System Information

☐ Micro-Inverter
Number of PV modules installed: _____
Number of Micro-Inverters installed: _____

☐ AC Module (ACM)
Number of ACMs installed: _____
*Note: Listed Alternating-Current Module (ACM) is defined in **CEC 690.2** and installed per **CEC 690.6***

1.1 Number of Branch Circuits, 1, 2 or 3: _____

1.2 Actual number of Micro-Inverters or ACMs per branch circuit: 1 _____ 2._____ 3._____

1.3 Total AC system power rating = (Total Number of Micro-Inverters or ACMs) * (AC inverter power output) = _____ Watts

1.4 Lowest expected ambient temperature for this plan in Table 1: For -1° to -5° C use 1.12 or for -6° to -10° C use 1.14 correction factors.

1.5 Average ambient high temperature for this plan: = +47° C
Note: For lower expected ambient or higher average ambient high temperatures, use Comprehensive Standard Plan.

2. Micro-Inverter or ACM Information and Ratings

Micro-Inverters with ungrounded DC inputs shall be installed in accordance with CEC

690.35. Micro-Inverter or ACM Manufacturer: _____

Model: _____

2.1 Rated (continuous) AC output power: _____ Watts

2.2 Nominal AC voltage rating: _____ Volts

2.3 Rated (continuous) AC output current: _____ Amps

If installing ACMs, skip [STEPS 2.4]

2.4 Maximum DC input voltage rating: _____ Volts (limited to 79 V, otherwise use the Comprehensive Standard Plan)

2.5 Maximum AC output overcurrent protection device (OCPD) _____ Amps

2.6 Maximum number of micro-inverters or ACMs per branch circuit: _____

3. PV Module Information

(If installing ACMs, skip to [STEP 4])

PV Module Manufacturer: _____

Model: _____

Module DC output power under standard test conditions (STC) = _____ Watts

3.1 Module V_{OC} at STC (from module nameplate): _____Volts

3.2 Module I_{SC} at STC (from module nameplate): _____Amps

3.3 Adjusted PV Module DC voltage at minimum temperature = [Table 1] _____ [cannot exceed Step 2.4]

Table 1. Module V_{OC} at STC Based on Inverter Maximum DC Input Voltage Derived from CEC 690.7																
Micro-Inverter Max. DC Input [STEP 2.4] (Volts)	34	37	40	43	46	49	52	55	58	61	64	67	70	73	76	79
Max. Module VOC @ STC, 1.12 (-1° to -5° C) Correction Factor (Volts)	30.4	33.0	35.7	38.4	41.1	43.8	46.4	49.1	51.8	54.5	57.1	59.8	62.5	65.2	67.9	70.5
Max. Module VOC @ STC, 1.14 (-6° to -10° C) Correction Factor (Volts)	29.8	32.5	35.1	37.7	40.4	43.0	45.6	48.2	50.9	53.5	56.1	58.8	61.4	64.0	66.7	69.3

4. Branch Circuit Output Information

Fill in [Table 3] to describe the branch circuit inverter output conductor and OCPD size. Use [Table 2] for determining the OCPD and Minimum Conductor size.

Table 2. Branch Circuit OCPD and Minimum Conductor Size*				
Circuit Current (Amps)	Circuit Power (Watts)	OCPD (Amps)	Minimum Conductor Size (AWG)	Minimum Metal Conduit Size for 6 Current Carrying Conductors
12	2880	15	12	¾"
16	3840	20	10	¾"
20	4800	25	8	1"
24	5760	30	8	1"

*CEC 690.8 and 210.19 (A)(1) factored in Table 2, conductors are copper, and insulation must be 90° C wet-rated. Table 2 values are based on maximum ambient temperature of 69° C, which includes 22° C adder, exposed to direct sunlight, mounted > 0.5 inches above rooftop, ≤ 6 current carrying conductors (3 circuits) in a circular raceway. Otherwise use Comprehensive Standard Plan.

Table 3. PV Array Configuration Summary			
	Branch 1	Branch 2	Branch 3
Number of Micro-Inverters or ACMs [Step 1]			
Selected Conductor Size [Table 2] (AWG)			
Selected Branch and Inverter Output OCPD [Table 2]			

5. Solar Load Center (if used)

5.1 Solar Load Center is to have a bus bar rating not less than 100 Amps. Otherwise use Comprehensive Standard Plan.

5.2 Circuit Power see [STEP 1] =_____ Watts

5.3 Circuit Current = (Circuit Power) / (AC voltage) = _____ Amps

Table 4. Solar Load Center and Total Inverter Output OCPD and Conductor Size**				
Circuit Current (Amps)	Circuit Power (Watts)	OCPD (Amps)	Minimum Conductor Size (AWG)	Minimum Metal Conduit Size
24	5760	30	10	½"
28	6720	35	8	¾"
32	7680	40	8	¾"
36	8640	45	8	¾"
40	9600	50	8	¾"
41.6	≤ 10000	60	6	¾"

**CEC 690.8 and 210.19 (A)(1) factored in Table 4, conductors are copper, and insulation must be 90° C wet-rated. Table 4 values are based on maximum ambient temperature of 47° C (no rooftop temperature adder in this calculation), ≤ 3 current carrying conductors in a circular raceway. Otherwise use Comprehensive Standard Plan.

6. Point of Connection to Utility:

6.1 Load Side Connection only! Otherwise use the Comprehensive Standard Plan.

6.2 Is the PV OCPD positioned at the opposite end from input feeder location or main OCPD location?

☐ Yes ☐ No (If No, then use 100% row in Table 5)

6.3 Per 705.12(D)(2): (Combined inverter output OCPD size + Main OCPD size) ≤ [bus bar size × (100% or 120%)]

Table 5. Maximum Combined Inverter Output Circuit OCPD									
Bus Bar Size (Amps)	100	125	125	200	200	200	225	225	225
Main OCPD (Amps)	100	100	125	150	175	200	175	200	225
Maximum Combined Inverter OCPD with 120% of bus bar rating (Amps)	20	50	25	60†	60†	40	60†	60†	45
Maximum Combined Inverter OCPD with 100% of bus bar rating (Amps)	0	25	0	50	25	0	50	25	0

†This plan limits the maximum system size to less than 10 kW, therefore the OCPD size is limited to 60 A. Reduction of Main Breaker is not permitted with this plan.

7. Grounding and Bonding

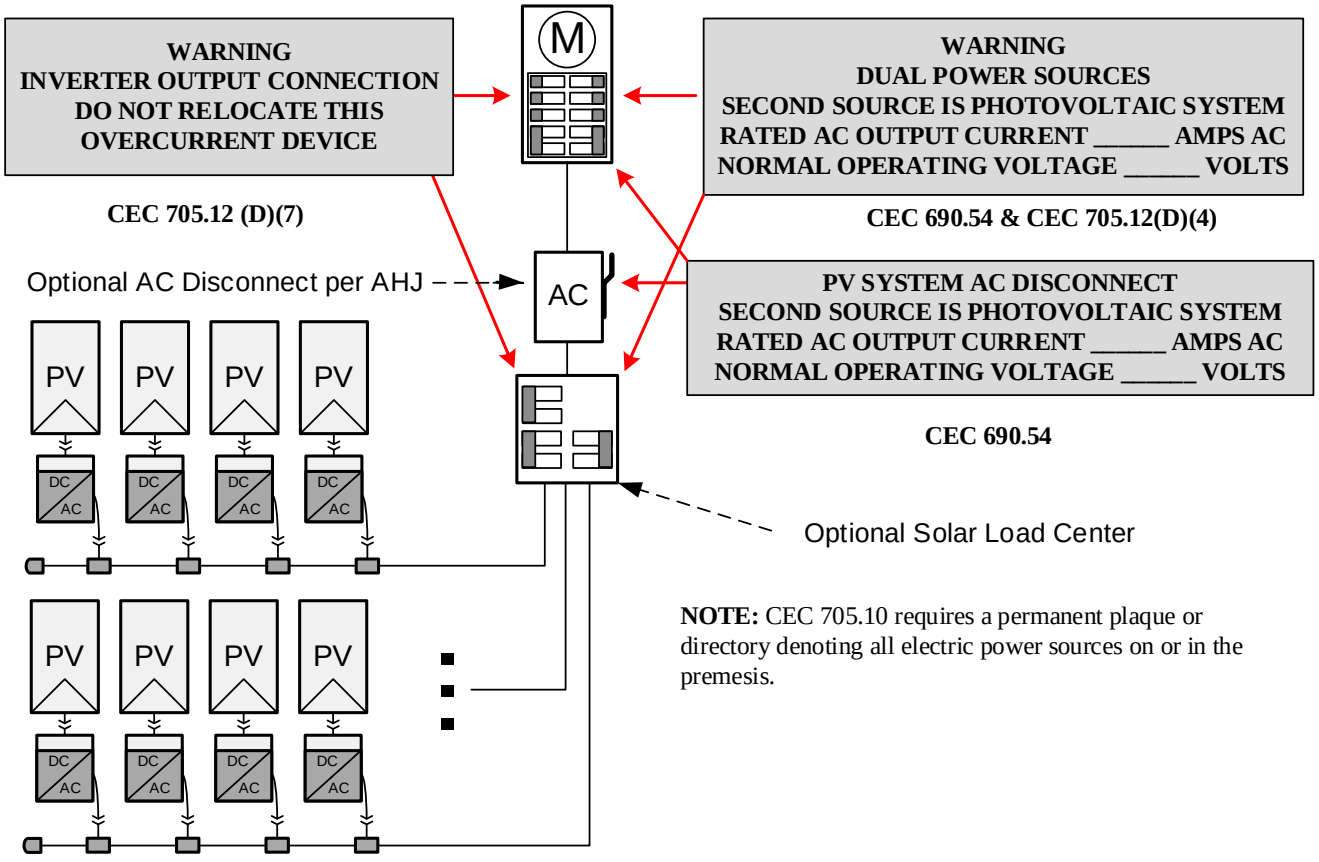
Check box if system is grounded or ungrounded: ☐ Grounded ☐ Ungrounded

For Micro-inverters with a grounded DC input, systems must follow the requirements of GEC (CEC 690.47) and EGC (CEC 690.43).

For ACM systems and Micro-inverters with ungrounded a DC input follow the EGC requirements of (CEC 690.43).

8. Markings

Informational note: ANSI Z535.4 provides guidelines for the design of safety signs and labels for application to products. A phenolic plaque with contrasting colors between the text and background would meet the intent of the code for permanency. No type size is specified, but 20 point (3/8”) should be considered the minimum.



Solar PV Standard Plan — Simplified
Central/String Inverter Systems for One- and Two-Family Dwellings

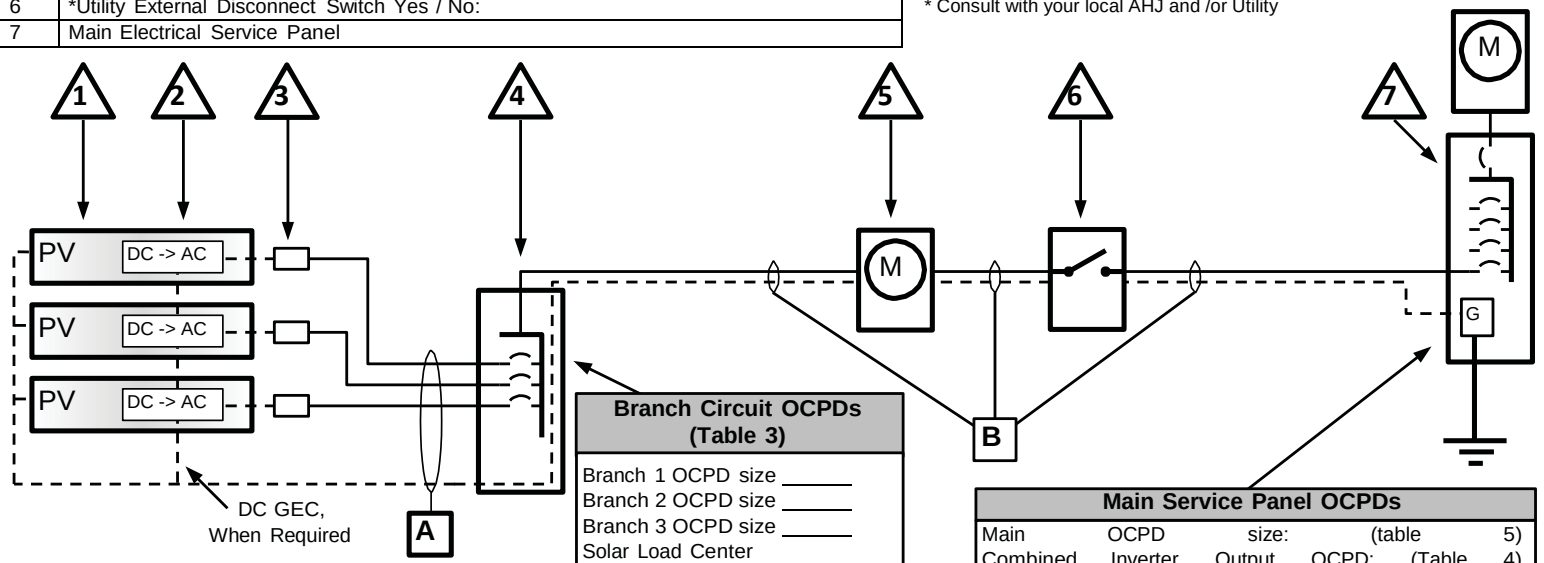
9. Single-Inverter Line Diagram

Equipment Schedule	
TAG	DESCRIPTION: (Provide model # if provided)
1	Solar PV Module or ACM:
2	Micro-inverter (if not ACM):
3	Junction Box (es):
4	Solar Load Center, Yes / No:
5	Performance Meter Yes / No:
6	*Utility External Disconnect Switch Yes / No:
7	Main Electrical Service Panel

Single-Line Diagram for Micro-inverters or ACMs

Check a box for dc system grounding: ☐ Grounded, ☐ Ungrounded
For ungrounded dc power systems, EGC is required
For grounded dc power systems, GEC & EGC are required
Refer to CEC 250.120 for EGC installation & Table 250.122 for sizing

* Consult with your local AHJ and /or Utility



Branch Circuit OCPDs (Table 3)

Branch 1 OCPD size _____
Branch 2 OCPD size _____
Branch 3 OCPD size _____
Solar Load Center
Busbar(Section 5) _____

Main Service Panel OCPDs

Main OCPD size: (table 5)
Combined Inverter Output OCPD: (Table 4)
Main Service Panel Busbar: (Table 5)

Conductor, Cable and Conduit Schedule

☐ TAG	Description and Conductor Type: (Table 3)	Conductor Size	Number of Conductors	Conduit/ Conductor/ Cable Type	Conduit Size
A	Current-Carrying Conductors: (for each branch circuit)				
	EGC:				
	GEC (when required):				
B	Current-Carrying Conductors:				
	EGC:				
	GEC (when required):				

SOLAR PV STANDARD PLAN - SIMPLIFIED

Items required: roof layout of all panels, modules, clear access pathways and approximate locations of electrical disconnecting means and roof access points.

Structural Criteria for Residential Rooftop Solar Energy Installations

Use of this document

This toolkit document includes a one-page list of structural criteria for over-the-counter or online approval, as well as attached tables and figures that supplement the criteria and explain their use. This document applies to flush-mounted solar arrays installed on the roofs of wood-framed one- and two- family dwellings. "Flush-mounted" means the modules are installed parallel to, and relatively close to, the roof surface (see the "Solar Array Check" section of the Structural Criteria for specific qualifying requirements). This list is intended to be a simple pre-installation check to gain reasonable assurance that the design of the solar array complies with the structural provisions of the 2013 California Building Code (CBC) and 2013 California Residential Code (CRC). It is not intended to provide post-installation inspection criteria.

Currently Used Expedited Solar Permitting Approaches

This document is intended for jurisdictions without an expedited process for residential solar structural permitting, and is not intended to replace or supplant procedures for jurisdictions with an expedited process already in place. Good examples from jurisdictions with provisions for expedited structural permitting include the City of Los Angeles, which exempts residential solar installations from structural permitting if five simple requirements are met, and the East Bay Green Corridor's streamlined solar permitting process, which uses structural criteria tailored to typical conditions for that consortium of nine cities.

Regional and Site Assumptions

This document is based on the following regional and site assumptions:

- The dwelling is located in a ZERO snow load area (see Map 1).
- The dwelling is not in Wind Exposure D (within 200 yards of the ocean or a large coastal bay).
- If in Wind Exposure B (urban, suburban or wooded areas), the dwelling may be located:
  - in a Special Wind Region (see Map 2) with design wind speeds between 110 and 130 mph.
  - on a tall hill, provided average slope is no steeper than 15%.
- If in Wind Exposure C (within 500 yards of large open fields or grasslands), the dwelling is:
  - in a standard 110 mph design wind speed region.
  - not on a hill with a grade steeper than 5%.

Additional Options

The Chief Building Official (CBO) may consider adding rows to the structural criteria, based on personal judgment and their jurisdiction's conditions and history. Possible additional questions include:

- Regional and Site Checks
  - If the jurisdiction is in a mixed snow load area, with zero snow load only at lower elevations, consider asking, "Is the dwelling lower than elevation _____ feet?"
  - If the jurisdiction is in a coastal region, consider asking, "Is the dwelling farther than 200 yards from the ocean or a large coastal bay?" to verify the dwelling is not in Wind Exposure D.

  - If the jurisdiction is in a Special Wind Region with design wind speeds between 115 and 130 mph, consider verifying that the dwelling is in Wind Exposure B by asking, "Is the dwelling in an urban, suburban or wooded area, and *not* within 500 yards of open fields and grasslands?"
  - If the jurisdiction is in a Special Wind Region with design wind speeds between 115 and 130 mph, consider verifying that there are no significant topographic wind speed-up effects by asking, "Is the dwelling in a relatively flat area (grade less than 5%) and not within 500 yards of the crest of a tall hill?"

- Roof Check
  - Based on the jurisdiction's one- and two-family housing stock and code compliance history, many CBOs will find it reasonable to assume that most dwellings' roof structures were designed to the building code in effect at the time the houses were built. If so, the roof structure code compliance check consists of the Contractor's visual roof audit, checking for unusual sagging or deterioration, without requiring additional measurements of existing rafters to check against span tables.
  - For CBOs of jurisdictions with evidence of structurally deficient one- and two-family housing stock or poor structural code compliance history, the CBO may elect to add the rafter span check option described in the criteria.

The Structural Toolkit and CRC Wind Speeds

The 2013 CRC contains an inconsistency related to wind speeds. Despite referencing ASCE 7-10 as its standard, the 2013 CRC's text and tables use outdated ASCE 7-05 wind speeds. Under the old ASCE 7-05/CBC 2010, the basic design wind speed in most regions of the state was 85 mph (max. 3 second gust in 50 years). Under ASCE 7-10/CBC 2013, the design wind speed has increased to 110 mph (max. 3 second gust in 700 years). Despite the different definitions of wind speed, design wind pressures remain essentially unchanged.

Because the toolkit's structural document is intended to be forward looking, all wind speeds in the toolkit document are based on the ASCE 7-10. This is clearly stated in the caption to the state wind speed map, and in the Table 1 footnotes. This anticipates an obvious and expected correction to the CRC; otherwise the toolkit would become immediately outdated when the CRC is amended to change the base design wind speed from 85 mph to 110 mph.

2013 CRC text (ASCE 7-05) wind speeds equivalent to the 2013 CRC and CBC Reference Standard (ASCE 7-10) are shown below. See ASCE 7-10 Table C26.5-6 for additional information.

2013 CRC Text ASCE 7-05	2013 CRC and CBC Referenced Standard ASCE 7-10
85 mph	110 mph
90 mph	115 mph
95 mph	120 mph
100 mph	126 mph
105 mph	133 mph

Structural Technical Appendix

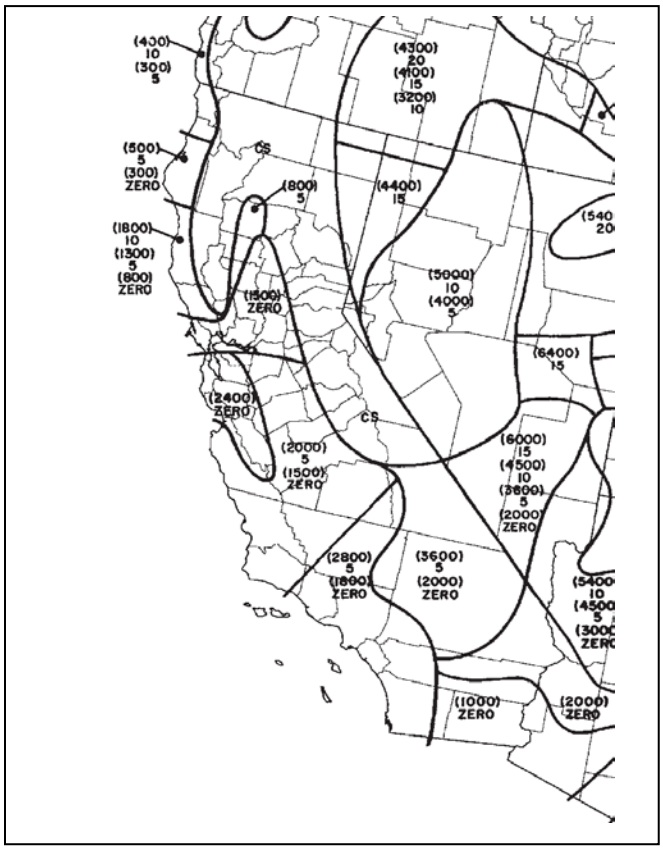
This toolkit document is supported by a Structural Technical Appendix that describes the technical analysis behind these criteria, which are based on structural engineering principles and the California Building and Residential Codes. The Technical Appendix also provides some additional guidance to address non- conforming items, such as when an anchor layout is not based on a solar support component manufacturer's guidelines, or when a coastal site is located within 200 yards of the ocean (Exposure D). This document can be found **online**.

Probability of Code Compliance

The Structural Technical Appendix includes a section that examines the probabilities associated with the assumptions behind Table 1 that allows six feet cross-slope anchor spacing in some circumstances. That statistical analysis estimates that the probability of code noncompliance for six feet anchor spacing is only 2 in a thousand installations (0.2%). Note that probability of structural failure is orders of magnitude lower than the probability of code *noncompliance*.

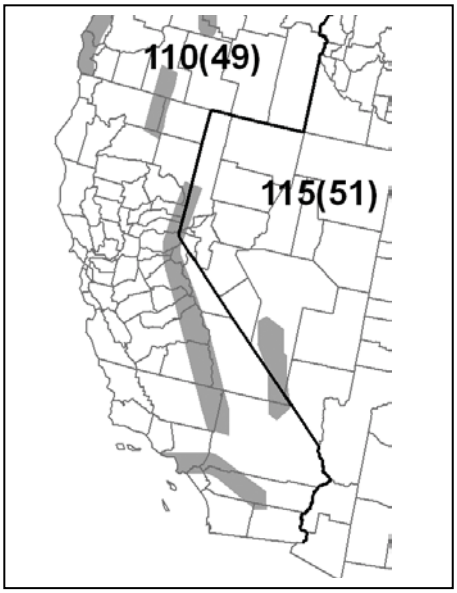
Map 1. California Ground Snow Load Map (Ref: ASCE 7-10).

The numbers in parentheses represent the upper elevation limits in feet for the ground snow load in psf listed below the elevation. Example: (2400) ZERO in the South San Francisco Bay Area Indicates that zero ground snow loads occur from sea level up to an elevation of 2,400 feet. CS indicates "Case Studies" where extreme local variations in ground snow loads occur. Non-zero snow load areas and CS areas are excluded from the use of this structural toolkit document. See the Technical Appendix for additional information.



Map 2. California Design Wind Speed Map (Ref: ASCE 7-10).

The number outside the parentheses represents the design wind speed in mph. Typical design wind speed is 110 mph. The gray shaded areas on the map indicate "Special Wind Regions" where higher wind speeds may apply. When the project is in a gray shaded area, contact the local building department for the design wind speed.



STRUCTURAL CRITERIA FOR RESIDENTIAL FLUSH-MOUNTED SOLAR ARRAYS

1. ROOF CHECKS

A. Visual Review/Contractor's Site Audit of Existing Conditions:
- 1) Is the roof a single roof without a reroof overlay? ☐ Y ☐ N
- 2) Does the roof structure appear structurally sound, without signs of alterations or significant structural deterioration or sagging, as illustrated in Figure 1? ☐ Y ☐ N

B. Roof Structure Data:
- 1) Measured roof slope (e.g. 6:12): _____:12
- 2) Measured rafter spacing (center-to-center): _____ inch
- 3) Type of roof framing (rafter or manufactured truss): ☐ Rafter ☐ Truss

2. SOLAR ARRAY CHECKS

A. Flush-mounted Solar Array:
- 1) Is the plane of the modules (panels) parallel to the plane of the roof? ☐ Y ☐ N
- 2) Is there a 2" to 10" gap between underside of module and the roof surface? ☐ Y ☐ N
- 3) Modules do not overhang any roof edges (ridges, hips, gable ends, eaves)? ☐ Y ☐ N

B. Do the modules plus support components weigh no more than 4 psf for photovoltaic arrays or 5 psf for solar thermal arrays? ☐ Y ☐ N

C. Does the array cover no more than half of the total roof area (all roof planes)? ☐ Y ☐ N

D. Are solar support component manufacturer's project-specific completed worksheets, tables with relevant cells circled, or web-based calculator results attached? ☐ Y ☐ N

E. Is a roof plan of the module and anchor layout attached? (see Figure 2) ☐ Y ☐ N

F. Downward Load Check (Anchor Layout Check):
- 1) Proposed anchor horizontal spacing (see Figure 2): ____' - ____"ft-in
- 2) Horizontal anchor spacing per Table 1: ____' - ____"ft-in
- 3) Is proposed anchor horizontal spacing equal to or less than Table 1 spacing? ☐ Y ☐ N

G. Wind Uplift Check (Anchor Fastener Check):
- 1) Anchor fastener data (see Figure 3):
  - a. Diameter of lag screw, hanger bolt or self-drilling screw: _____inch
  - b. Embedment depth of rafter: _____inch
  - c. Number of screws per anchor (typically one): _____
  - d. Are 5/16" diameter lag screws with 2.5" embedment into the rafter used, OR does the anchor fastener meet the manufacturer's guidelines? ☐ Y ☐ N

3. SUMMARY

☐ A. All items above are checked YES. No additional calculations are required.

☐ B. One or more items are checked NO. Attach project-specific drawings and calculations stamped and signed by a California-licensed civil or structural engineer.

Job Address: _____ Permit #: _____
Contractor/Installer: _____ License # & Class: _____
Signature: _____ Date: _____ Phone #: _____

Optional Additional Rafter Span Check Criteria

[At option of CBO, insert rows (4) to (7) below into table above after row 1.B.(3)]

1. ROOF CHECKS

B. Roof Structure Data:
- 4) Measured rafter size (e.g. 13/4 x 33/4, not 2x4): ____ x ____ inch
- 5) Measured rafter horizontal span (see Figure 4): ____' - ____"ft-in
- 6) Horizontal rafter span per Table 2: ____' - ____"ft-in
- 7) Is measured horizontal rafter span less than Table 2 span? ☐ Y ☐ N ☐ Truss

Table 1. Maximum Horizontal Anchor Spacing				
Roof Slope		Rafter Spacing		
		16” o.c.	24” o.c.	32” o.c.
Photovoltaic Arrays (4 psf max)				
Flat to 6:12	0° to 26°	5’-4”	6’-0”	5’-4”
7:12 to 12:12	27° to 45°	1’-4”	2’-0”	2’-8”
13:12 to 24:12	46° to 63°	1’-4”	2’-0”	2’-8”
Solar Thermal Arrays (5 psf max)				
Flat to 6:12	0° to 26°	4’-0”	4’-0”	5’-4”
7:12 to 12:12	27° to 45°	1’-4”	2’-0”	2’-8”
13:12 to 24:12	46° to 63°	Calc. Req’d	Calc. Req’d	Calc. Req’d

Solar support component manufacturer’s guidelines may be relied upon to ensure the array above the roof is properly designed, but manufacturer’s guidelines typically do NOT check to ensure that the roof itself can support the concentrated loads from the solar array. Table 1 assumes that the roof complied with the building code in effect at the time of construction, and places limits on anchor horizontal spacing to ensure that a roof structure is not overloaded under either downward loads or wind uplift loads. Note 4 below lists the basic assumptions upon which this table is based.

Table 1 Notes:

1. Anchors are also known as “stand-offs,” “feet,” “mounts” or “points of attachment.” Horizontal anchor spacing is also known as “cross-slope” or “east-west” anchor spacing (see Figure 2).
2. If anchors are staggered from row-to-row going up the roof, the anchor spacing may be twice that shown above, but no greater than 6’-0”.
3. For manufactured plated wood trusses at slopes of flat to 6:12, the horizontal anchor spacing shall not exceed 4’-0” and anchors in adjacent rows shall be staggered.
4. This table is based on the following assumptions:
    - The roof structure conformed to building code requirements at the time it was built.
    - The attached list of criteria is met.
    - Mean roof height is not greater than 40 feet.
    - Roof sheathing is at least 7/16” thick oriented strand board or plywood. 1x skip sheathing is acceptable.
    - If the dwelling is in Wind Exposure B (typical urban, suburban or wooded areas farther than 500 yards from large open fields), no more than one of the following conditions apply:
        - The dwelling is located in a Special Wind Region with design wind speed between 115 and 130 mph per ASCE 7-10.
        - The dwelling is located on the top half of a tall hill, provided average slope is less than 15%.
    - If the dwelling is in Wind Exposure C (within 500 yards of large open fields or grasslands), all of the following conditions apply.
        - Design wind speed is 110 mph or less (not in a Special Wind Region).
        - The dwelling is not located on the top half of a tall hill.
    - The solar array displaces roof live loads (temporary construction loads) that the roof was originally designed to carry.
    - The Structural Technical Appendix provides additional information about analysis assumptions.

Table 2. Roof Rafter Maximum Horizontal Span (feet - inches)1								
Assumed Vintage	Nominal Size	Actual Size	Non-Tile Roof[2]			Tile Roof[3]		
			Rafter Spacing					
			16” o.c.	24” o.c.	32” o.c.	16” o.c.	24” o.c.	32” o.c.
Post-1960	2x4	1½”x3½”	9’-10”	8’-0”	6’-6”	8’-6”	6’-11”	5’-6”
	2x6	1½”x5½”	14’-4”	11’-9”	9’-6”	12’-5”	10’-2”	8’-0”
	2x8	1½”x7¼”	18’-2”	14’-10”	12’-0”	15’-9”	12’-10”	10’-3”
Pre-1960	2x4	1¾”x3¾”	11’-3”	9’-9”	7’-9”	10’-3”	8’-6”	6’-9”
	2x6	1¾”x5¾”	17’-0”	14’-0”	11’-3”	14’-9”	12’-0”	9’-9”
	2x8	1¾”x7¾”	22’-3”	18’-0”	14’-6”	19’-0”	15’-6”	12’-6”

Beyond a visual review by the contractor checking for unusual sagging or deterioration, some CBOs may want additional assurance that the roof structure complies with structural building code requirements. Table 2 is an optional table some CBOs may elect to use to provide additional assurance by requiring a check of existing roof rafter spans, and supports optional criteria 1.B.5 and 1.B.6. For post-1960 construction, these span tables match the rafter span tables found in the 2013 California Building and Residential codes. For pre-1960 construction, the rafter span tables are based on structural calculations with lumber sizes and wood species and grade appropriate for older construction. Note 5 below lists the basic assumptions upon which this table is based.

Table 2 Notes:

1. See Figure 4 for definition of roof rafter maximum horizontal span.
2. “Non-tile Roof” = asphalt shingle, wood shingle and wood shake, with an assumed roof assembly weight of 10 psf.
3. “Tile Roof” = clay tile or cement tile, with an assumed roof assembly weight of 20 psf
4. Unaltered manufactured plated-wood trusses may be assumed to be code compliant and meet intent of Table 2.
5. This table is based on the following assumptions:
    - Span/deflection ratio is equal to or greater than 180.
    - For post-1960 construction, wood species and grade is Douglas Fir-Larch No. 2.
    - For pre-1960 construction, wood species and grade is Douglas Fir-Larch No. 1.
    - Other wood species and/or grade are also acceptable if allowable bending stress is equal or greater to that listed.

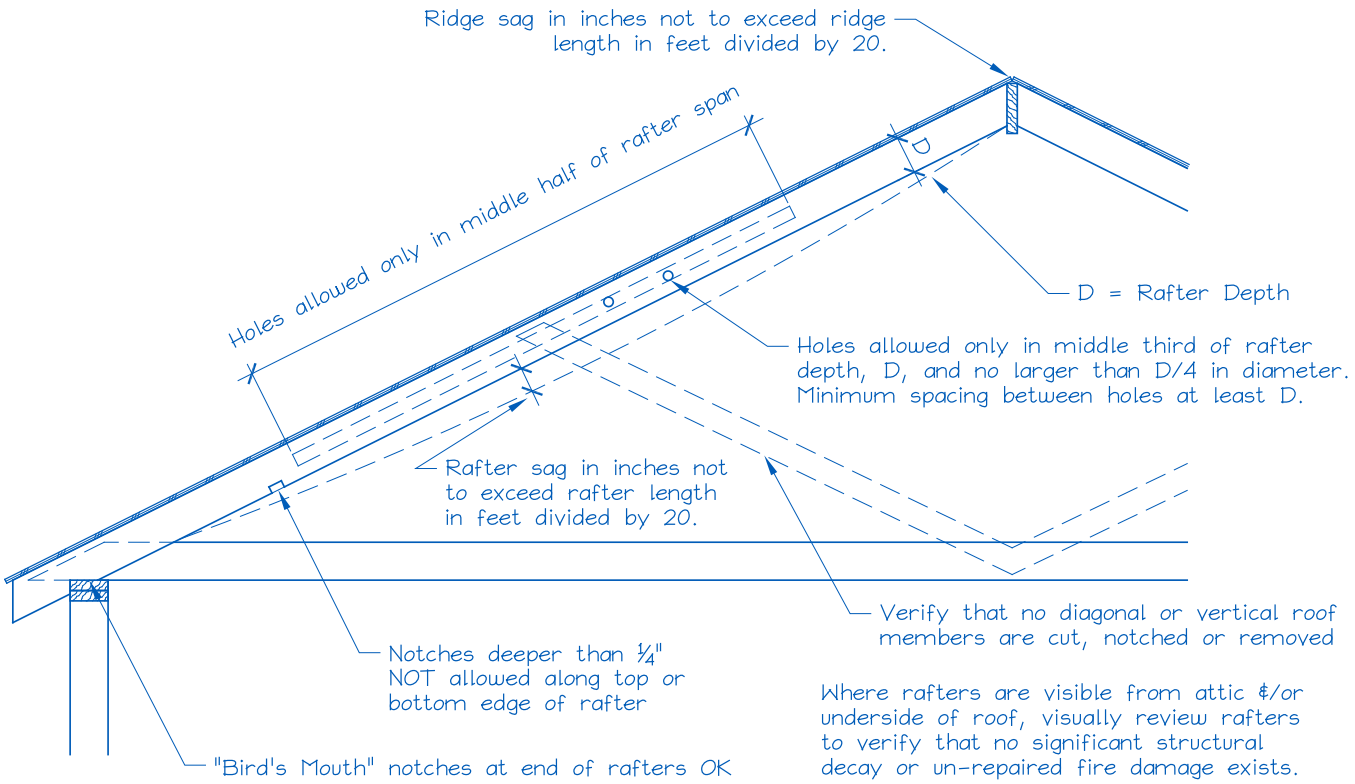


Figure 1. Roof Visual Structural Review (Contractor's Site Audit) of Existing Conditions.

The site auditor should verify the following:

1. No visually apparent disallowed rafter holes, notches and truss modifications as shown above.
2. No visually apparent structural decay or un-repaired fire damage.
3. Roof sag, measured in inches, is not more than the rafter or ridge beam length in feet divided by 20.

Rafters that fail the above criteria should not be used to support solar arrays unless they are first strengthened.

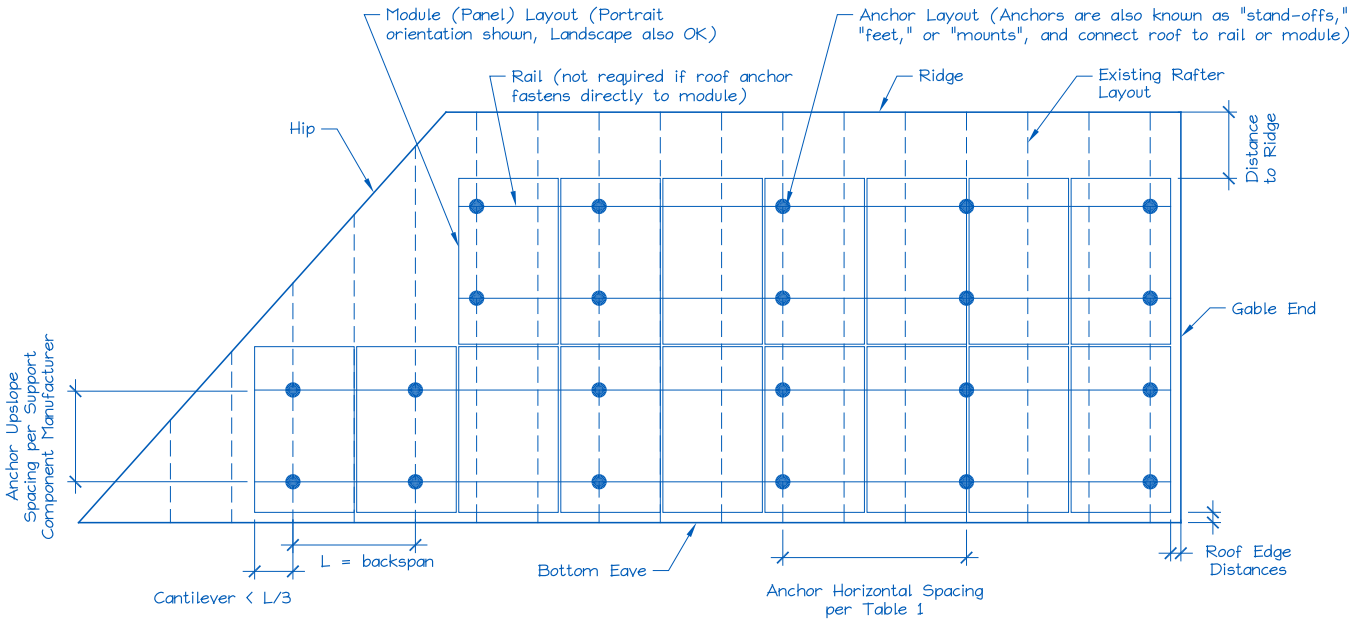


Figure 2. Sample Solar Panel Array and Anchor Layout Diagram (Roof Plan).

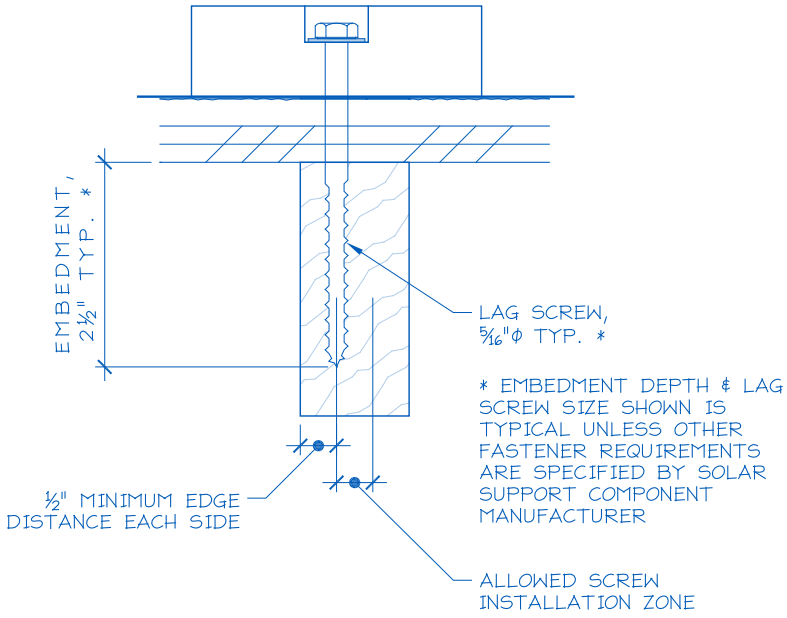


Figure 3. Typical Anchor with Lag Screw Attachment.

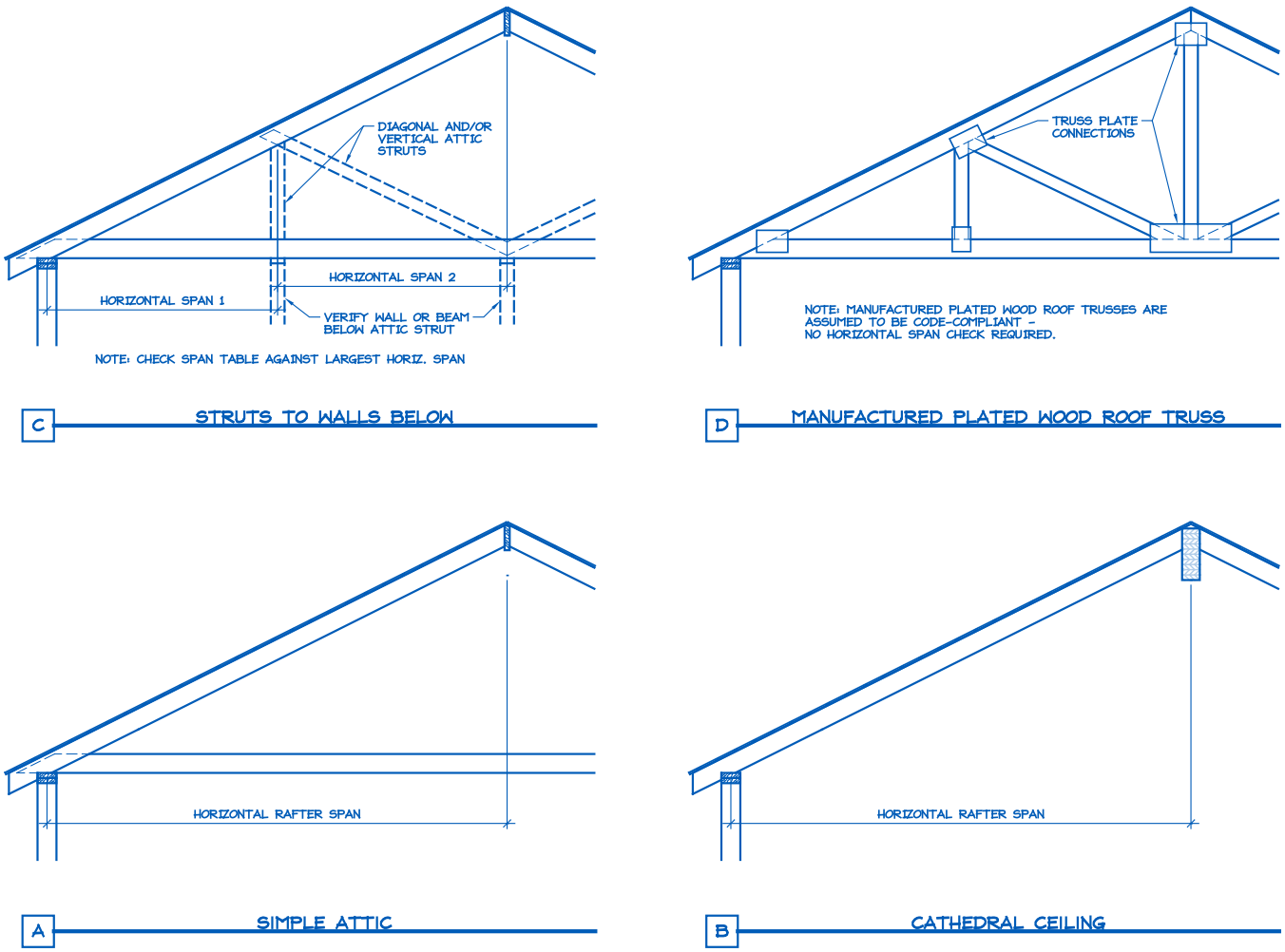


Figure 4. Definition of Rafter Horizontal Span.